

Military Device (JAN thru JANS) Reliability Statement

When questions arise concerning reliability levels of a specific device, requests for reliability values such as FIT and MTTF often follow. Historically, Microsemi has not generated such values for our Military JAN thru JANS devices for the following reasons:

- Reliability is built into all Military grade devices (equivalent SCD's included). Military catalog devices have a C = 0 failure rate imbedded in the test requirements. This means that any lot that has a single failure during final Group Tests is rejected and cannot be shipped as a Military branded device.
- As a result, reliability calculations for FIT and MTTF for Military devices would always be calculated using $r = 0$ (where "r" is the number of rejects).
- The standard time on test (H) during burn-in operations for Group B testing is 340 hours and 1000 hours for Group C testing.
- Since the Acceleration Factor (A_f) is a constant for the specified burn-in temperature, the resulting FIT rates would then only have one variable left in the basic Failure Rate formula (below) which is the number of devices (D) processed. The more parts that are processed for a particular slash sheet (product family), the lower the FIT value. It essentially means that high runners would have very low FIT values and low runners would have higher FIT values, but the actual reliability for both would be identical.

$$\lambda_{hour} = \frac{X^2(\alpha, \nu)}{2 \times D \times H \times A_f}$$

where: λ = Lambda (failure rate) used to calculate both FIT & MTTF
 $X^2/2$ = probability estimation for the number of failures or rejects
 D = Number of Devices Tested
 H = Test Hours per Device
 A_f = Acceleration Factor derived from the Arrhenius equation
 (primary test dependant variable is burn-in temperature)

While FIT values can be generated for Military grade devices, for the reasons stated above, they would only truly be an indicator of the volume of product produced rather than the actual Reliability. One compelling case point, JANS are the highest reliability level offered for Military devices, but they are, due to demand, produced in much lower volumes than the JAN-JANTXV devices and would thus erroneously result in higher FIT values.

For a more detailed account of basic reliability calculations, use the link below to refer to MicroNote 1002, "Calculating Reliability using FIT & MTTF: Arrhenius HTOL Model" on Microsemi's website in the Reliability Section of Application Notes (MicroNotes).

<http://www.microsemi.com/en/sites/default/files/datasheets/1002.pdf>